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BOTANY.¹

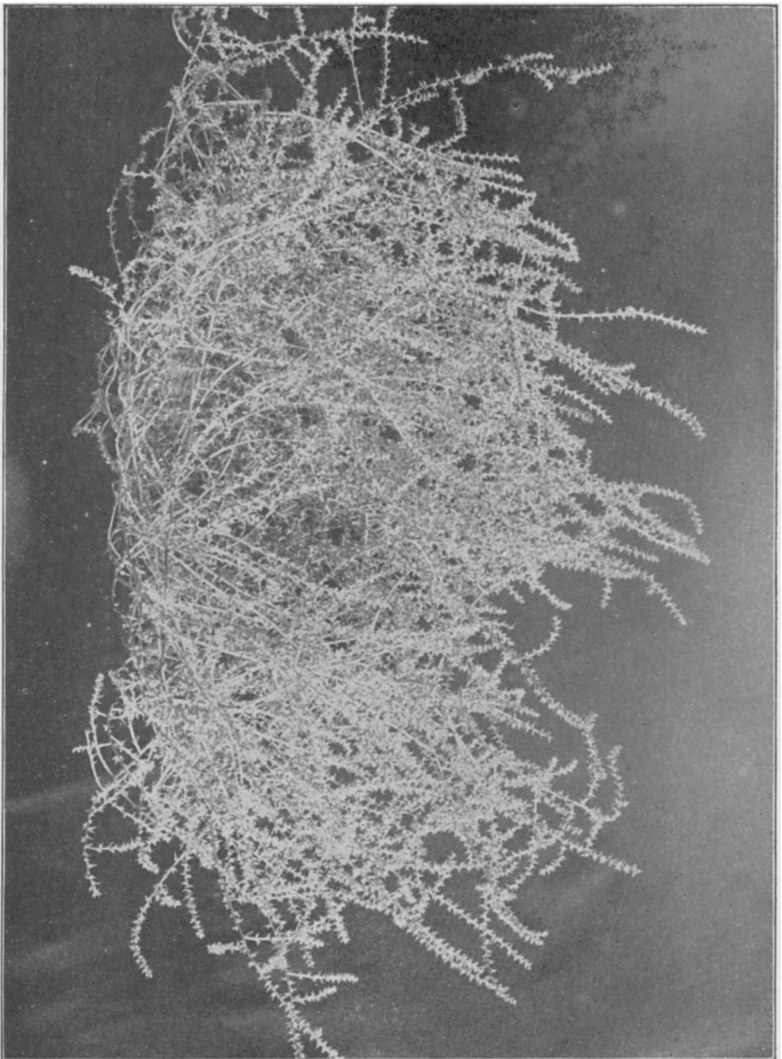
What is Mycoderma?—1. In my papers on the yeasts, I have mentioned the doubtful position of the sprouting fungus *Mycoderma* which morphologically and systematically stands near to the *Saccharomycetaceae*. From the latter, it is easily distinguished on account of its high refractive power, the cells being also rectangular, not spore-bearing, and very apt to aggregate in masses, or in a film. When beer, wine, or other sugar-containing liquids are exposed to the air, the *Mycoderma* will very soon form a gray, greasy looking, uneven film on the surface of the liquid. Hitherto, it was supposed that this fungus could not form alcohol; Lasché has, however, found four species which yield $\frac{1}{4}$ to $2\frac{1}{2}$ vol % of alcohol (See Der Braumeister, Chicago, 1891, No. 7); Winogradsky found that the morphology of the cells changes according to the amount of organic material given in a constant solution of inorganic nutritive matter. (See Centralbl. f. Bakteriologie u. Parasitenkunde, 1884, p. 164). Lately, F. Lafar showed that at least one species will produce acetic acid. (Ibid, XIII, p. 684–697 1893, w. pl.).

In 1879 Hansen expressed his opinion that there were undoubtedly more than the two species—*M. cerevisiae* and *M. vini*—described by Pasteur (Studies on fermentation, pp. 77, 110, pl. IV) in existence. These two named species cannot be distinguished from each other, and they must be regarded as synonyms to all the species—at present 7—known. The macroscopic appearance of these fungi was mentioned in the January No. of the *American Monthly Microscopical Journal*.

2. The name *Mycoderma* was given by Pasteur to the bacterium of acetic fermentation. As far back as 1834, Kützing determined the vegetable nature of this ferment; he named it *Ulvina aceti*. Pasteur (See Etudes sur la vinaigre) and Turpin took the question up again, and studied the morphology of the organism. In 1879, Hansen found a new species which assumes a blue color with iodine or IKa. , while the other species became yellow when thus treated. He found, lately, still another species which is also colored blue with iodine, namely, the species *kützingianum*. The genus-name was, on the suggestion of Zopf, changed into *Bacterium*. (See Berichte der Deutschen Botanischen Gesellschaft, 1893, p. (69–73). Three species of acetic fermentation

¹Edited by Prof. C. E. Bessey, University of Nebraska, Lincoln, Nebraska,

PLATE X.



Russian Thistle, about one-sixth natural size, from one of the streets bordering the city park of Lincoln, Nebraska.

bacteria are thus known at present, namely, (1) *Bacterium aceti* (Kütz.) Zopf, (2) *B. pasteurianum* Hansen, and (3) *B. kützingianum* Hansen. The cardinal temperatures are: Minimum for (1), 4°–5° C; for (2), 5°–6° C. Maximum is for all of them 42°–43° C, and optimum 34° C.

Morphologically, these species consist of (1) long cells, (2) swollen cells, and (3) chains of short bacula. By 40° C–40°, 5 C pure cultures were in good development, during which some of the cells of the chains grew very long, and in twenty-four hours, there was a typical vegetation of long cells, totally different from the original culture. If this new culture is exposed to a temperature of 34° C, the original chains are again formed. The long cells measured 200 μ and more; by 34° C; they first swell in one or more places, sometimes assuming ball shape (diam. 11 μ), then they are divided into typical chains. Nägeli regarded the long and the swollen cells as abnormal forms.

When we speak of the influence of outward agencies upon the life-activity of organisms like those mentioned above, we have generally described the influence in its action only upon *one feature* of such activity. It is not at all sure that the cardinal temperatures of *fermentation* are identical with those of the *life* of the yeast, or with those of the *cell-division* or *spore formation* of the latter. We know that the cardinal temperatures of germination, transpiration, respiration, assimilation, geotropism, heliotropism, hydrotropism, rheotropism, etc., etc., in "higher" plants are not always identical. In the instance mentioned above, we see that the *cell-division* has its cardinal temperatures, a conclusion which we may draw from the observations. We further see that bacteria are more polymorphous than is suspected, and that a new road is open for investigation which doubtless will tend to broaden our knowledge of microorganisms and of many important physiological questions.

J. CHRISTIAN BAY.

The so-called "Russian Thistle."—It is the fate of few weeds to reach so suddenly such great notoriety as that recently attained by *Salsola kali* L. var. *tragus* DC., the so-called "Russian Thistle." If one turns to any of the botanical manuals he finds no plant under this common name. He will find the "Common Salt-wort." of the "sandy shore, New England to Georgia" described in such mild terms as to give no idea of the weed as it appears to the farmer upon the western plains.

The species is a native of mountainous regions in both hemispheres.

In Europe it occurs from Spain to France, Belgium, Holland, Great Britain, Ireland, Denmark, Norway and Sweden, and along the Mediterranean coast of France, Italy, Greece and Turkey. Even the sandy tracts of interior countries are not free from it; thus it is found in Germany, Austria, Hungary and Russia. It occurs also in temperate Asia. In America as stated above, it extends from New England to Georgia. The variety is apparently much less widely distributed, but the exact limits of its geographical range are not well defined, most recent authors not regarding it as sufficiently distinct to warrant separate treatment.

The technical description of the variety (to which alone the name Russian Thistle is applied) as drawn up by L. H. Dewey of the United States Department of Agriculture, is as follows:

"*Salsola kali* L. var. *tragus* DC. Prod. XIII, 2, 187 (1849). Herbaceous, annual, diffusely branching from the base, usually densely bushy at maturity, .5 to 1 m. high and twice as broad, smooth or slightly hispid; root simple, dull white, slightly twisted near the apex; leaves alternate, sessile; of the young plant deciduous, succulent, linear or subterete, 3 to 6 cm. long, spiny-pointed, and with narrow, denticulate, membranaceous margins near the base; leaves of mature plant persistent, each subtending two leaf-like bracts and a flower, at intervals of 2 to 10 mm., rigid, narrowly ovate, often denticulate near the base, spiny-pointed, usually striped with red like the branches, 6 to 10 mm. long; bracts divergent, like the leaves in size and in all respects but position; flowers solitary and sessile, perfect, apetalous, about 10 mm. in diameter; calyx membranaceous, persistent, enclosing the depressed fruit, usually rose colored, gamosepalous, cleft nearly to the base into five unequal divisions about 4 mm. long, the upper one broadest, the two next the subtending leaf next in size and the lateral ones narrow, each with a beak-like, connivent apex, and bearing midway on the back a membranaceous, striate, erose-margined wing about 3 mm. long, the upper and two lower ones much broader than the lateral ones; stamens 5, about equalling the calyx lobes; pistil simple; styles 2, slender, about 1 mm. long; seed 1, obconical, depressed, about 2 mm. in diameter, dull gray or green, exalbuminous, the thin seed-coat closely covering the spirally-coiled embryo; embryo about 12 mm. long with 2 terete cotyledons."

Salsola is one of the prominent genera of the family *Chenopodiaceæ*, and is the most important member of the tribe *Salsoleæ*. Its forty spe-

²Bulletin 31, Agricultural Experiment Station of the University of Nebraska, Dec. 1893.

cies are very widely distributed in Europe, Asia, North and South Africa, America and Australia.

The Russian Thistle appears to have come to this country in flaxseed imported directly from Europe to South Dakota seventeen or eighteen years ago. For a while it was popularly supposed that the Russian settlers in South Dakota had purposely brought it for use as a forage plant, but this is now generally discredited. The name "Russian Thistle" is, however, so well fixed that it will continue to be used in spite of its inappropriateness, just as we say "Canada Thistle" for another Old World weed.

For a number years after its introduction it attracted little attention, and it was not until seven or eight years ago (1886) that it began to be troublesome in South Dakota. Since this time it has spread with much rapidity. Both of the Dakotas are now badly overrun with it. A few years ago it invaded Nebraska, coming into the State about Valentine, and in Knox, Cedar and Dixon Counties. It probably came to the first named place with the United States soldiers stationed at Ft. Niobrara, a few miles east of the town of Valentine. The frequent transfers of troops from forts in South Dakota afford ready means of transportation to weeds of this nature. For several years it has been spreading from this point. The counties mentioned are separated from South Dakota by the Missouri River, but here and there are ferries over which teams frequently pass, and at these points the Russian Thistles are very abundant.

The railroads have aided materially in their distribution, as is shown by the fact that by the end of 1893, Russian Thistles were to be found in nearly all parts of Nebraska, and in nearly all cases they were at first confined to a narrow belt along the track. Year by year they spread from this belt, moving most rapidly along the lines of greatest travel. The wind, also, is an efficient agent in spreading them, since in many cases, the nearly spherical plants are broken off at the root, and rolled for long distances as "tumbleweeds," scattering their seeds throughout their course.

In Minnesota, Iowa and Wisconsin, Russian Thistles have appeared, and here again they have been brought in by the railroads. The reason why the railroads have had so much to do with the distribution of this weed, is that finding by the side of the tracks much unsodded ground, they spring up here in great numbers, and in the fall when they break off by the winds they are caught up the passing trains and carried away on the trucks or steps of the cars or on the pilot or in the machinery of the engine.

The states of the Plains, the Dakotas and Nebraska, and those next adjacent, have taken steps to warn their people of this invading weed by bulletins and through the public press. The United States Department of Agriculture sent an agent to inspect the invaded region, and issued a special bulletin on the subject. The Russian Thistle is a common topic for papers and discussions before Agricultural and Horticultural Societies, farmer's institutes, farmer's clubs, alliance meetings, etc. It will soon be so well known upon the Plains that it will no longer be allowed to grow unmolested because unrecognized.

CHARLES E. BESSEY.